

## REPORT DOCUMENTATION PAGE

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<b>14. ABSTRACT</b> <p>Over the last 15 years, the U. S. photonics industry has benefited both directly and indirectly from the DARPA UPR (University Photonics Research) program which supports university research in photonics. DARPA asked OIDA to explore how DARPA could stimulate direct industry participation in a new version of the UPR program: Photonics Industry-University Collaborations (PIC). The three month seedling project was to validate that industry would participate in a full PIC program.</p> <p>Survey results are included in the Final Report. In summary, industry is positive about, and generally interested in participating in, a PIC program, but feel strongly that there would need to be a high level of coordination between academia and industry. This would involve frequent face-to-face meetings and periodic reports. OIDA seeks to act as the Program Manager for such a PIC program as OIDA has the requisite access to both CxOs of corporations with interests in photonics and leading academic photonics researchers.</p>						
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**Photonics Industry-University Collaborations (PICs)**

**Award Number: W911NF-08-1-0234**

**FINAL TECHNICAL REPORT**

April 22, 2008 – July 30, 2008



Prepared by

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1220 Connecticut Avenue, NW  
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**June 2009**

Prepared for

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**20090721139**

## **1.0 Introduction**

Over the last 15 years, the U. S. photonics industry has benefited both directly and indirectly from the DARPA UPR (University Photonics Research) program which supports university research in photonics. DARPA asked OIDA to explore how DARPA could stimulate direct industry participation in a new version of the UPR program: Photonics Industry–University Collaborations (PIC). The seedling project was awarded on June 17, 2008. The three month seedling project was to validate that industry would participate in a full PIC program.

## **2.0 Summary of Program Objectives and Accomplishments**

### **a. Task Objective(s)**

The primary objective of the full PIC program is to establish industry/university collaborative research in photonics by specifically matching university research projects with industry needs. The projects would involve long-term basic research and target revolutionary research. Industry will demonstrate its commitment to the research efforts by making significant cash contributions to augment DARPA's sponsorship.

The objective this PIC seedling project was to validate that industry would participate in PIC. This would be accomplished by meeting with CxOs of both large and small companies which have efforts in photonics and getting their input.

### **b. Technical Problem**

The key to success of the seedling objective was to engage corporate sponsors at the CxO level, which requires face-to-face high level meetings.

### **c. General Methodology**

The three-month effort included:

- Interview past University Center program managers and participants.
- Prepare a position paper and presentation materials on the proposed framework for PICs for meetings with CxOs.
- Prepare a questionnaire to be completed during meetings.
- Set up appointments and meet with CxOs.
- Analyze data from meetings.
- Prepare recommendations to DARPA.

OIDA contacted senior executives of over 40 major corporations that either use photonic products, undertake photonics research and development, or both. OIDA targeted CEO/CTO level executives and although the time constraints of the task dictated the access to these high-level executives, all persons interviewed had discretionary spending authority in photonics at their respective companies.



OIDA conducted interviews face to face or via phone to establish the perspectives of the photonics industry on various program structure possibilities. Topics discussed included areas such as specific photonics research, generic photonics research, publications, and technology transfer. More specifically, the questions focused on determining the willingness of the photonics industry to put "skin" into the game—real dollars. OIDA probed the motivating factors, the availability of discretionary money for photonics research at academia, and the willingness to work collaboratively with the government and academia in a new program.

#### **d. Technical Results**

The survey results were collated and analyzed into a presentation titled "UPR Survey Results," Appendix A. This report was presented at the DARPA sponsored industry-academia collaboration workshop. The electronics, optoelectronics, and MEMs industries presented to an audience consisting of aerospace/defense industry, general electronic industry, and DARPA Program Managers.

#### **e. Important Findings and Conclusions**

The interviews generated a number of key take-a-ways. We present these below and provide additional comments as appropriate.

- 1) The majority of photonic-based companies were positive about DARPA funding of photonics research. Many respondents, however, used the caveat 'depends...' in their responses.
- 2) When asked for a four-year commitment, which was the typical length of previous UPR programs, a number of respondents cited comfort levels only in the one- to two-year range. The turbulence of the industry and associated photonics company performance made many of the respondents very uncomfortable with four-year horizons for research programs.
- 3) The majority of industry companies accepted technology tracks – centers with specific narrow photonics focus – as a good idea.
- 4) The photonics industry was very uncomfortable with the so-termed "haggle-free" IP licenses that a government-funded photonics program could generate. This is a clear differentiator as compared to the silicon semiconductor industry where cross-licensing and haggle-free IP licenses (non-exclusive, etc.) are the norm. Exclusivity in photonics IP is still the objective, and the potential of its availability increased companies' interest level.
- 5) In terms of matching ratios, the photonics industry centered around a Government matching level in the range of 3 or 4 to 1 in order to generate sufficient internal support for a new photonics program. This may not be close to the silicon semiconductor industry norm of 1 or 2 to 1, but does indicate that the photonics industry is willing to fight for discretionary, unbudgeted funds with a strong case for matching.
- 6) Industry very clearly indicated that it did not want to dedicate resources to manage or even co-manage a photonics research program, but that it would be will-

ing to work with 3<sup>rd</sup> parties as necessary. Industry definitely wanted to participate in an advisory board, and have some level of influence over academic photonics research if they provided cost share funding. Executives indicated their desire to get involved with such a program, and in many interviews, stated that it is important for the industry.

- 7) In any future program, face-to-face meetings are critical and need to be frequent, perhaps much more so than in the existing UPR program.
- 8) Industry indicated a desire for more technical reports covering subjects of interest to internal experts. This way, industry felt that it could disseminate the university-generated data and results in a more meaningful manner.
- 9) Many industry executives requested that the new UPR program have an increased level of coordination in the university-industry communication.

#### **f. Implications for Future Research**

Industry is positive about, and generally interested in participating in, a PIC program, but feel strongly that there would need to be a high level of coordination between academia and industry. This would involve frequent face-to-face meetings and periodic reports. OIDA seeks to act as the Program Manager for such a PIC program as OIDA has the requisite access to both CxOs of corporations with interests in photonics and leading academic photonics researchers.

#### **g. Significant Hardware Development**

Not applicable.

#### **h. Special Comments**

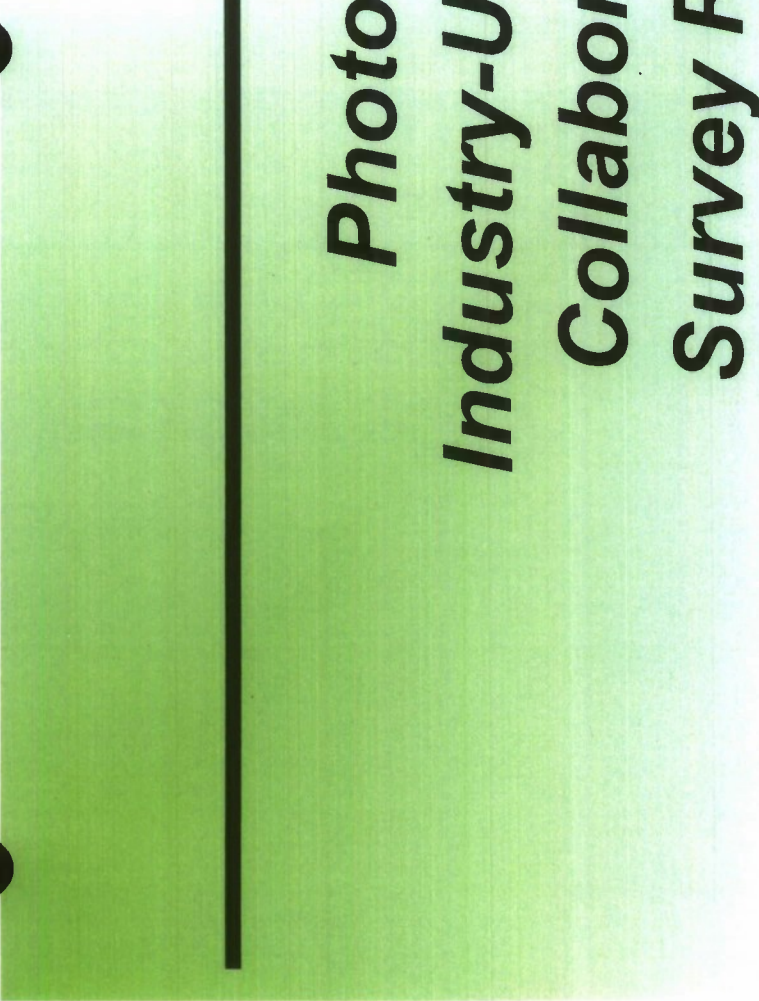
Interim and Final Progress Reports, Manuscripts and Reprints are not applicable under this grant.

### **3.0 Financial**

*See Cost Data as of June 30, 2008, Page 4.*

Cost Data as of June 30, 2008  
DARPA Contract No. W911NF-08-1-0234

Cost Elements	Cumulative thru 6/30/08	
Labor Category		
	<u>Hours</u>	<u>Amount</u>
<b>DIRECT COSTS</b>		
Principal Investigator	200	\$25,678.00
Senior Technical	60	\$4,653.00
Administrative Support	120	<u>\$4,410.00</u>
<b>Total Direct Costs</b>		\$34,741.00
 <b>TRAVEL COSTS</b>		
West Coast		\$7,955.02
East Coast		<u>\$5,045.08</u>
<b>Total Travel Costs</b>		\$13,000.10
 Indirect Costs		
G&A (58.75%)		\$28,047.90
 <b>TOTAL COSTS</b>		<u><b>\$75,789.00</b></u>



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# ***Photonics Industry-University Collaborations Survey Results***



**OIDA --- Promoting the Photonics Industry**



# Survey framework

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- Over 38 companies interviewed
  - Face-to-face or phone calls
  - Focus on larger corporations
    - 34 public; 4 private
- People interviewed are divisional leaders (or higher)
  - Aimed for CEO/CTO ranks
    - Folks with discretionary spending in photonics
- Questions were focused on
  - Government, universities, funding mechanics, contractual, control



**Gauging the pulse of photonics industry**

Michael Lebby (lebby@oida.org)



# Companies contacted

Company	Position/Title	Company	Position/Title
3M	Lab Dir	IBM	CTO
Alcatel-Lucent	CTO	JDSU	Div CTO
Arasor	Dir. Engineering	Infinera	CTO
AT&T	ED	KLA	CTO
Avanex	CTO	Kodak	GM/VP
Boeing	Fellow	Kopin	COO
Bookham	CEO	Lumileds	CEO
Coherent	CEO	Motorola	Dir., R&D
Corning	Sr. VP	Newport	VP
Cree	CEO	Osram	VP
Cyoptics	CEO	Schott	CEO
Finisar	VP, Engineering	Sharp USA	GM
Gooch & Housego	Dir., R&D	Silex	GM/COO
General Dynamics	Sr. Mgr, Leadership	Spectrolab	CTO
Google	CTO	Sun	VP, R&D
Group4	CEO	Telcordia	President
Hamamatsu	Dir., R&D	Tessera	Sr. VP
HP	Div. CTO	Trumpf	CEO USA
Hughes	GM R&D	Veeco	VP

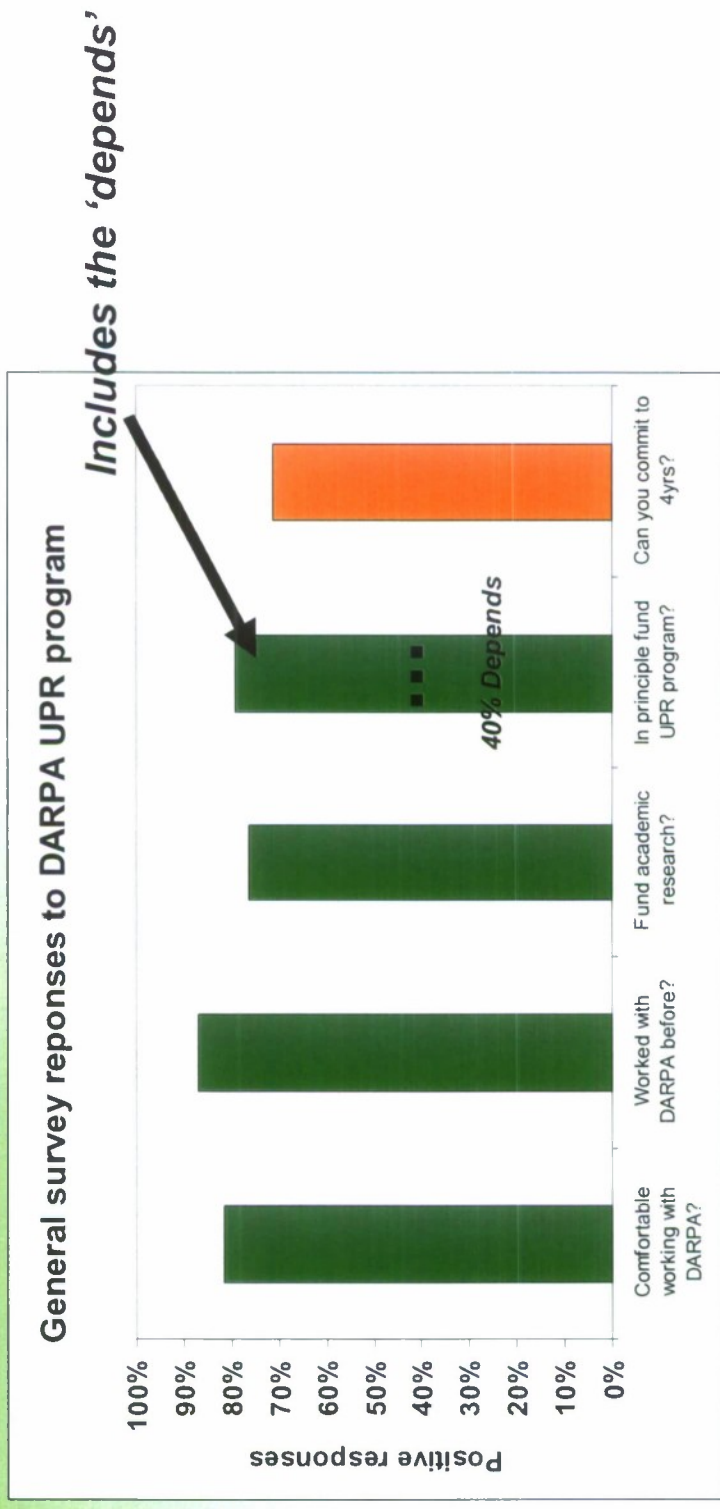


Michael Lebby (lebby@oia.org)

**Broad cross-section of candidates**

# Industry perspective with UPR

- Majority positive about DARPA funding photonics research
- 4-year commitment is an issue in industry (1-2 years cited)



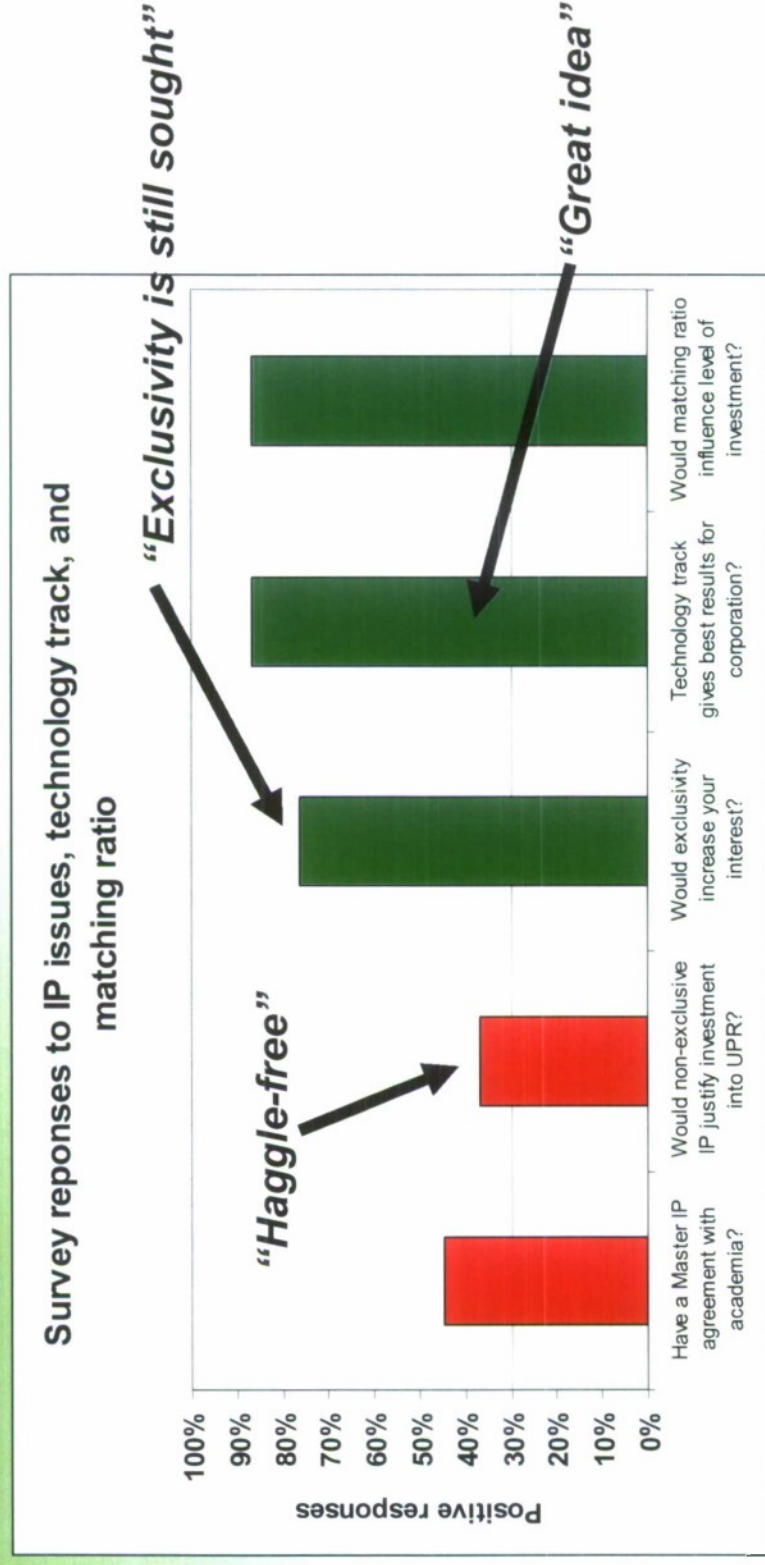
Michael Lebby (lebby@oida.org)

Overall acceptance of UPR program



# Industry views on IP and alignment

- Technology tracks generally accepted as good idea
- Industry uncomfortable even with haggle-free IP license

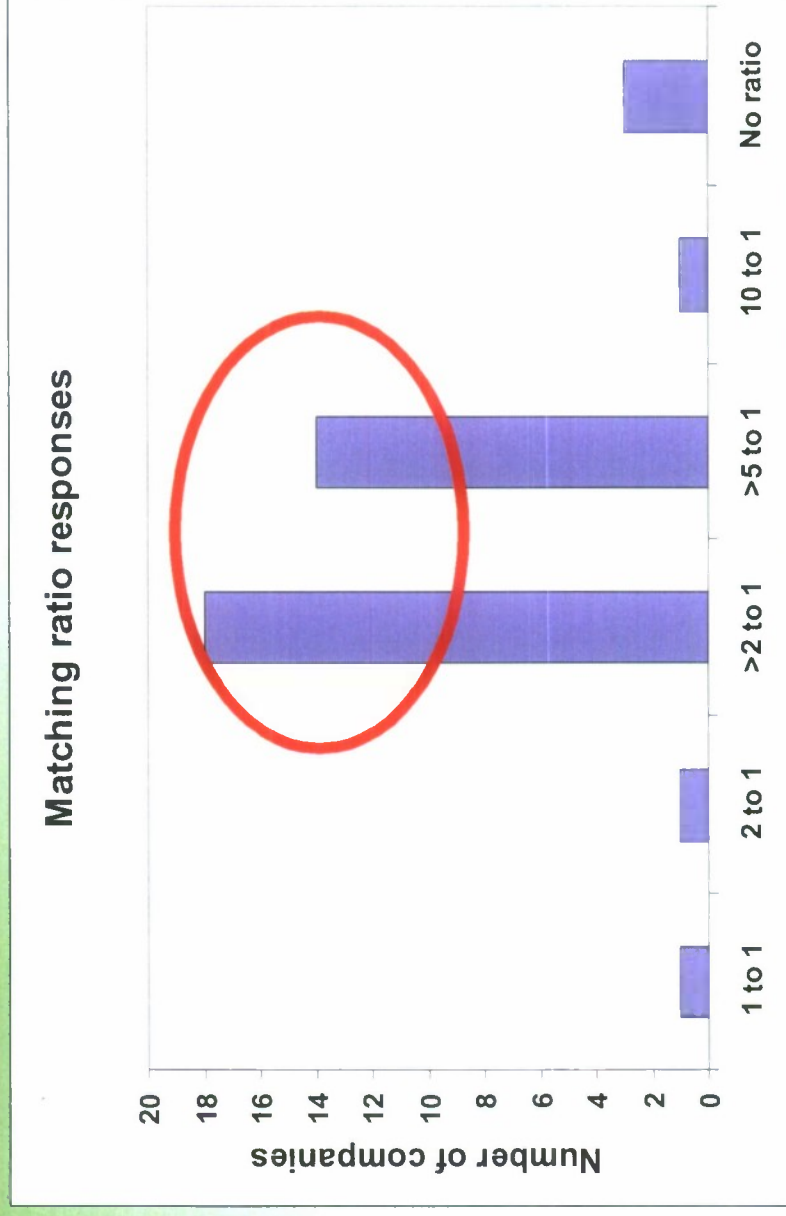


**IP still problematic; technology tracks ok**

Michael Lebby (lebby@oida.org)

# Survey results on matching ratio

- Center of gravity is 3-4:1
- Most respondents cite they need strong case for management



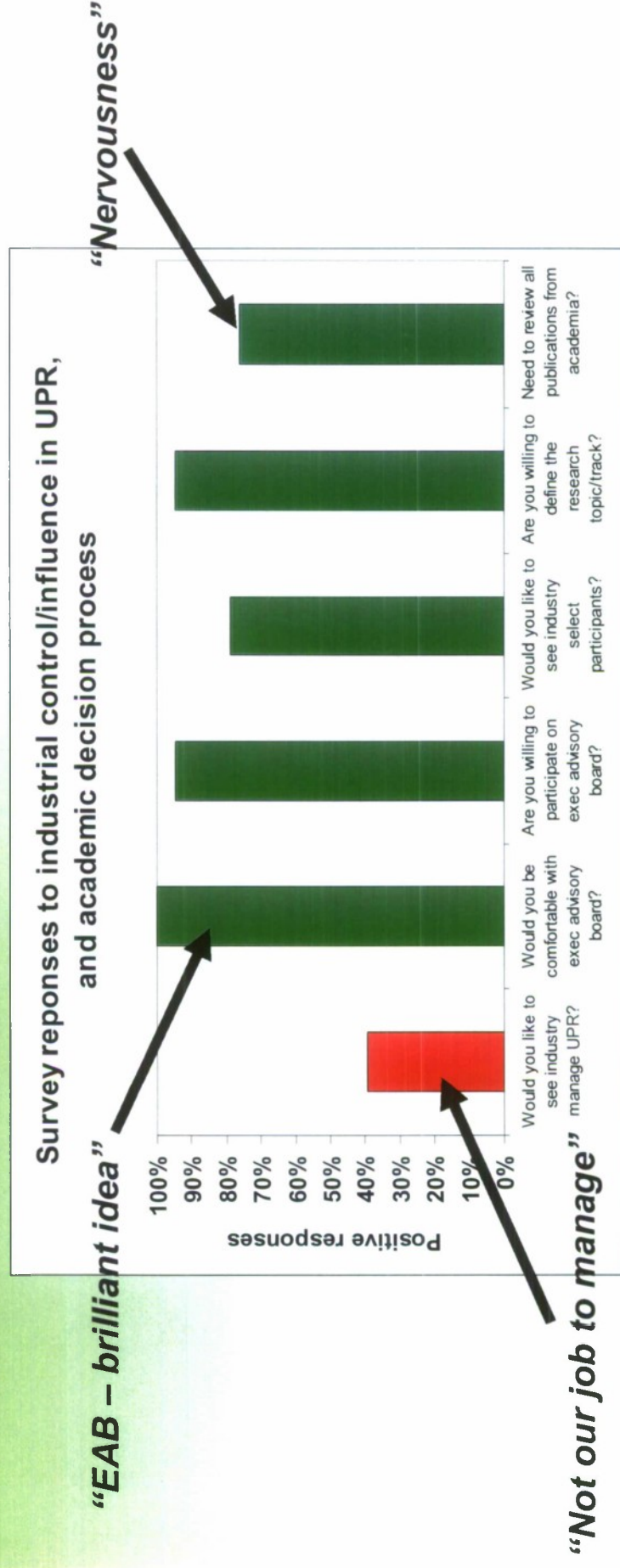
Michael Lebby (lebby@oida.org)

**Folks are willing to fight for funds...**



# Issues of control/influence in UPR

- Industry does not want to dedicate resources to manage
- Executive advisory board 100% accepted
- Industry wants to influence academic aligned to them...

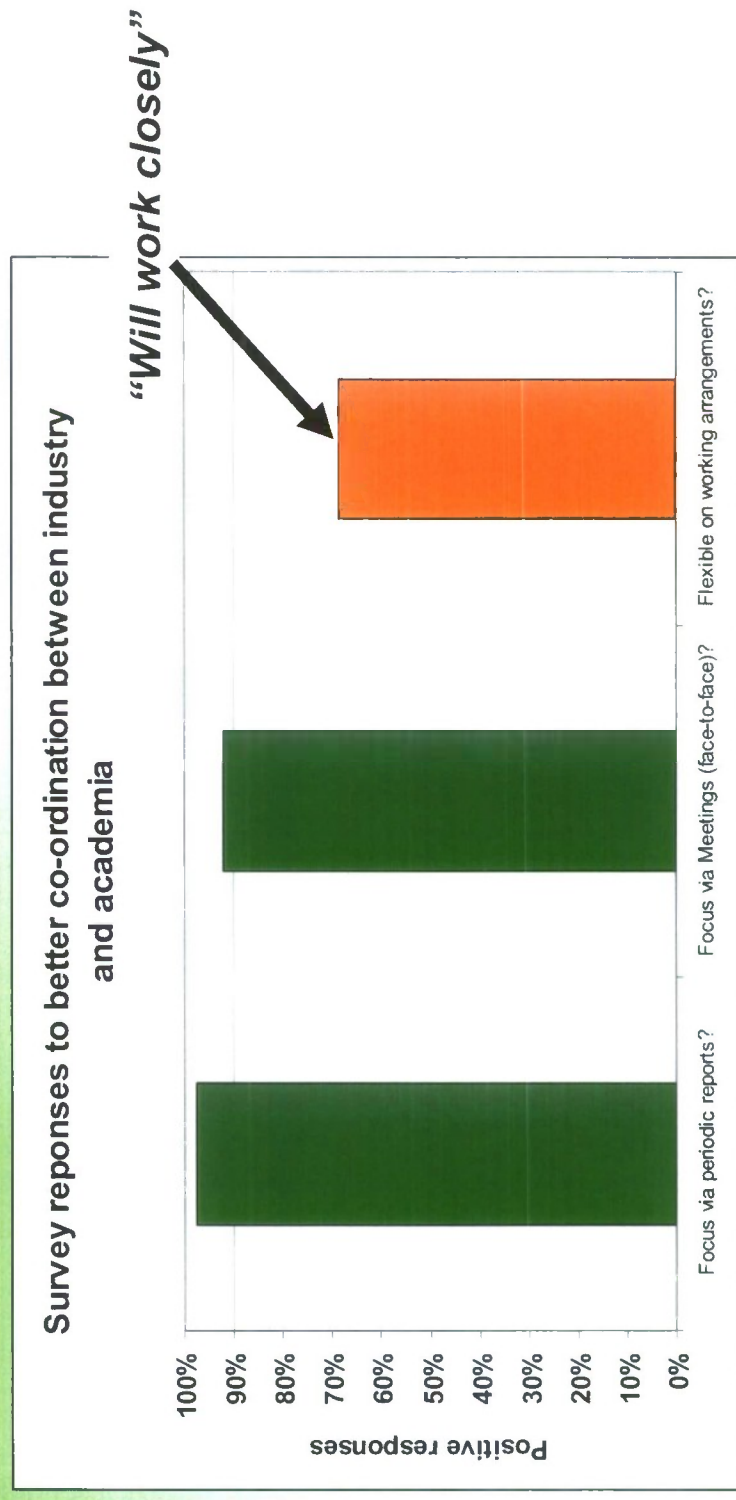


Michael Lebby (lebby@oida.org)

**Getting involved is important to industry**

# Coordination between academia and industry

- Face-to-face meetings are critical (need to be frequent)
- Industry wants more reports for subject matter experts



Michael Lebby (lebby@oida.org)

Perhaps more coordination in UPR?



# *Potential OIDA value to UPR*

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- Closer coupling with companies
  - More frequent reviews/meetings/advisory board
- Greater technical publications
  - Companies want to review results with subject matter experts in their own time
- Both companies and DARPA need interface via central point
- General view that funding level for 5 technology tracks might be too dilute for significant impact
  - Fewer tracks, higher funding focus
  - \$50M, 5 centers, is ~\$2.5M/center/Yr or \$500k/PI/Yr
  - \$60M, 3 centers, is ~\$4M/center/Yr or \$800k/PI/Yr



Michael Lebby (lebby@oida.org)

**Tighter connections are needed**